IT IS CLAIMED

1. A method for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein at least a portion of the end nodes and fiber nodes each include local clock circuitry for generating a local clock signal, the method comprising:

providing a common clock reference signal to the local clock circuitry in selected network devices to thereby cause each of the selected network devices to be synchronized to the common clock reference signal;

wherein the common clock reference signal is distributed to the selected network devices via a first downstream channel.

2. The method of claim 1 wherein the common clock reference signal corresponds to a downstream channel frequency of n MHz.

3. The method of claim 2 wherein the access network is configured to operate at a root clock frequency of m MHz, and wherein a frequency of the common clock reference signal n is an integer multiple of m.

4. The method of claim 2 wherein the frequency n of the common clock reference signal is substantially equal to 20.48 MHz.

5. The method of claim 2 wherein the frequency n of the common clock reference signal is within a frequency range of 5-54 MHz.

6. The method of claim 1 wherein the common clock reference signal is derived from a clock source external to the access network.

7. The method of claim 6 wherein the common clock reference signal is derived from a Stratum 1 clock source.

8. The method of claim 1 wherein the selected network devices include a plurality of distributed cable modem termination systems residing external to the head end complex;

the method further comprising synchronizing local clock signals generated at each of the distributed cable modem termination systems.

9. The method of claim 1 wherein the plurality of fiber nodes includes a first RF fiber node and a first packet fiber node, the first packet fiber node including a distributed cable modem termination system (DCMTS);

the method further comprising providing the common clock reference signal to the DCMTS to thereby cause a local clock signal at the DCMTS to be synchronized to the common clock reference signal.

10. The method of claim 1 wherein said access network is a cable network implemented in accordance with a DOCSIS standardized protocol, and wherein said end nodes are cable modems.

11. The method of claim 10 wherein the plurality of fiber nodes includes a plurality of packet fiber nodes, each packet fiber node including a respective distributed cable modem termination system (DCMTS);

wherein the method further comprises load sharing cable modems across different DCMTS systems.

12. The method of claim 1 wherein the common clock reference signal corresponds to a modulated carrier signal having master timestamp information embedded therein.

13. The method of claim 1 wherein the plurality of fiber nodes includes a plurality of packet fiber nodes, each packet fiber node including a respective distributed cable modem termination system (DCMTS);

the method further comprising synchronizing upstream channels across each of the DCMTS systems.

14. A method for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein the plurality of fiber nodes includes at least one RF fiber node and at least one packet fiber node, the at least one packet fiber node including a distributed cable modem termination system (DCMTS), and wherein at least a portion of the end nodes and fiber nodes each include local clock circuitry for generating local clock signals, the method comprising:

receiving a common clock reference signal at a first packet fiber node;

generating, using the common clock reference signal, a local clock signal at the first packet fiber node which is synchronized with the common clock reference signal;

providing the local clock signal to components at the first packet fiber node, including the DCMTS.

15. The method of claim 14 wherein the common clock reference signal is received via a first downstream channel.

16. The method of claim 14 wherein the common clock reference signal corresponds to a downstream channel frequency of n MHz.

17. The method of claim 16 wherein the access network is configured to operate at a root clock frequency of m MHz, and wherein a frequency of the common clock reference signal n is an integer multiple of m.

18. The method of claim 16 wherein the frequency n of the common clock reference signal is substantially equal to 20.48 MHz.

19. The method of claim 16 wherein the frequency n of the common clock reference signal is within a frequency range of 5-54 MHz.

20. The method of claim 14 wherein the common clock reference signal is derived from a clock source external to the access network.

21. The method of claim 20 wherein the common clock reference signal is derived from a Stratum 1 clock source.

22. The method of claim 14 wherein said access network is a cable network implemented in accordance with a DOCSIS standardized protocol, and wherein said end nodes are cable modems.

23. The method of claim 14 wherein the common clock reference signal corresponds to a modulated carrier signal having master timestamp information embedded therein.

24. A method for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein the plurality of fiber nodes includes at least one RF fiber node and at least one packet fiber node, the at least one packet fiber node including a distributed cable modem termination system (DCMTS), and wherein at least a portion of the end nodes and fiber nodes each include

local timestamp circuitry for generating local timestamp information, the method comprising:

receiving timestamp synchronization information at a first packet fiber node; and

generating, using the timestamp synchronization information, local timestamp information at the first packet fiber node which is synchronized with the timestamp synchronization information.

25. The method of claim 24 further comprising providing the timestamp synchronization information to a first DTMTS residing at the first packet fiber node.

26. The method of claim 24 further comprising providing the local timestamp information to a first DTMTS residing at the first packet fiber node.

27. The method of claim 24 further comprising providing the local timestamp information to selected cable modems to thereby cause timestamps generated at each of the selected cable modems to be synchronized with the local timestamp information generated at the first packet fiber node.

28. The method of claim 24 wherein the timestamp synchronization information is received as a modulated carrier signal having the timestamp synchronization information embedded therein.

29. The method of claim 28 wherein the modulated carrier signal corresponds to a downstream channel frequency of n MHz.

30. The method of claim 28 wherein the access network is configured to operate at a root clock frequency of m MHz, and wherein a frequency of the modulated carrier signal n is an integer multiple of m.

31. The method of claim 28 wherein the frequency n of the modulated carrier signal is substantially equal to 20.48 MHz.

32. The method of claim 28 wherein the frequency n of the modulated carrier signal is within a frequency range of 5-54 MHz.

33. The method of claim 24 wherein said access network is a cable network implemented in accordance with a DOCSIS standardized protocol, and wherein said end nodes are cable modems.

34. A system for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein at least a portion of the end nodes and fiber nodes each include local clock circuitry for generating a local clock signal, the system comprising:

at lest one CPU;

memory; and

at least one interface for communicating with nodes in the access network;

the system being configured or designed to provide a common clock reference signal to the local clock circuitry in selected network devices to thereby cause each of the selected network devices to be synchronized to the common clock reference signal;

wherein the common clock reference signal is distributed to the selected network devices via a first downstream channel.

35. The system of claim 34 wherein the common clock reference signal corresponds to a downstream channel frequency of n MHz.

36. The system of claim 35 wherein the access network is configured to operate at a root clock frequency of m MHz, and wherein a frequency of the common clock reference signal n is an integer multiple of m.

37. The system of claim 35 wherein the frequency n of the common clock reference signal is substantially equal to 20.48 MHz.

38. The system of claim 35 wherein the frequency n of the common clock reference signal is within a frequency range of 5-54 MHz.

39. The system of claim 34 wherein the common clock reference signal is derived from a clock source external to the access network.

40. The system of claim 39 wherein the common clock reference signal is derived from a Stratum 1 clock source.

41. The system of claim 34 wherein the plurality of fiber nodes includes a first RF fiber node and a first packet fiber node, the first packet fiber node including a distributed cable modem termination system (DCMTS);

the system being further configured or designed to provide the common clock reference signal to the DCMTS to thereby cause a local clock signal at the DCMTS to be synchronized to the common clock reference signal.

42. The system of claim 34 wherein said access network is a cable network implemented in accordance with a DOCSIS standardized protocol, and wherein said end nodes are cable modems.

43. The system of claim 42 wherein the plurality of fiber nodes includes a plurality of packet fiber nodes, each packet fiber node including a respective distributed cable modem termination system (DCMTS);

the system being further configured or designed to load share cable modems across different DCMTS systems.

44. The system of claim 34 wherein the common clock reference signal corresponds to a modulated carrier signal having master timestamp information embedded therein.

45. The system of claim 34 wherein the plurality of fiber nodes includes a plurality of packet fiber nodes, each packet fiber node including a respective distributed cable modem termination system (DCMTS);

the system being further configured or designed to synchronize upstream channels across each of the DCMTS systems.

46. The system of claim 34 further comprising a redundant clock circuit configured or designed to generate the common clock reference signal.

47. A system for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein the plurality of fiber nodes includes at least one RF fiber node and at least one packet fiber node, the system comprising:

at lest one CPU;

memory;

at least one interface for communicating with nodes in the access network;

a distributed cable modem termination system (DCMTS); and

a clock circuit for generating local clock signals;

the system being configured or designed to receive a common clock reference signal;

the system being further configured or designed to generate, using the common clock reference signal, a local clock signal which is synchronized with the common clock reference signal;

the system being further configured or designed to provide the local clock signal to the DCMTS.

48. The system of claim 47 further being configured or designed to receive the common clock reference signal received via a first downstream channel.

49. The system of claim 47 wherein the common clock reference signal corresponds to a downstream channel frequency of n MHz.

50. The system of claim 49 wherein the frequency n of the common clock reference signal is substantially equal to 20.48 MHz.

51. The system of claim 49 wherein the frequency n of the common clock reference signal is within a frequency range of 5-54 MHz.

52. The system of claim 47 wherein said access network is a cable network implemented in accordance with a DOCSIS standardized protocol, and wherein said end nodes are cable modems.

53. The system of claim 47 wherein the common clock reference signal corresponds to a modulated carrier signal having master timestamp information embedded therein.

54. The system of claim 47 further comprising:
a timestamp generator; and
signal modulation circuitry.

55. A system for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each

fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein the plurality of fiber nodes includes at least one RF fiber node and at least one packet fiber node, and wherein at least a portion of the end nodes each include local timestamp circuitry for generating local timestamp information, the system comprising:

at lest one CPU;

memory;

at least one interface for communicating with nodes in the access network;

a distributed cable modem termination system (DCMTS); and

a timestamp circuit for generating local timestamp information

the system being configured or designed to receive timestamp synchronization information; and

the system being further configured or designed to generate, using the timestamp synchronization information, local timestamp information which is synchronized with the timestamp synchronization information.

56. The system of claim 55 wherein the system is further configured or designed to provide the timestamp synchronization information to the DTMTS.

57. The system of claim 55 fu wherein the system is further configured or designed to provide the local timestamp information to the DTMTS.

58. The system of claim 55 wherein the system is further configured or designed to provide the local timestamp information to selected cable modems to thereby cause timestamps generated at each of the selected cable modems to be synchronized with the local timestamp information.

59. The system of claim 55 wherein the timestamp synchronization information is received as a modulated carrier signal having the timestamp synchronization information embedded therein.

60. The system of claim 59 further comprising signal modulation circuitry configured or designed to recover the timestamp synchronization information embedded in the modulated carrier signal.

61. The system of claim 59 wherein the modulated carrier signal corresponds to a downstream channel frequency of n MHz.

62. The system of claim 59 wherein the frequency n of the modulated carrier signal is substantially equal to 20.48 MHz.

63. The system of claim 59 wherein the frequency n of the modulated carrier signal is within a frequency range of 5-54 MHz.

64. The system of claim 55 wherein said access network is a cable network implemented in accordance with a DOCSIS standardized protocol, and wherein said end nodes are cable modems.

65. The system of claim 55 further comprising a comparator configured or designed to compare the timestamp synchronization information with the local timestamp information, and further configured or designed to generate an error signal;

wherein the error signal is provided to the timestamp generator to facilitate synchronization of the local timestamp information with the timestamp synchronization information.

66. A computer program product for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein the plurality of fiber nodes includes at least one RF fiber node and at least one

packet fiber node, the at least one packet fiber node including a distributed cable modem termination system (DCMTS), and wherein at least a portion of the end nodes and fiber nodes each include local clock circuitry for generating local clock signals, the computer program product comprising:

a computer usable medium having computer readable code embodied therein, the computer readable code comprising:

computer code for receiving a common clock reference signal at a first packet fiber node;

computer code for generating, using the common clock reference signal, a local clock signal at the first packet fiber node which is synchronized with the common clock reference signal;

computer code for providing the local clock signal to components at the first packet fiber node, including the DCMTS.

67. The computer program product of claim 66 wherein the system is further configured or designed to receive the common clock reference signal via a first downstream channel.

68. The computer program product of claim 66 wherein the access network is configured to operate at a root clock frequency of m MHz, and wherein a frequency of the common clock reference signal n is an integer multiple of m.

69. The computer program product of claim 66 wherein the common clock reference signal corresponds to a modulated carrier signal having master timestamp information embedded therein.

70. A computer program product for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end

complex and the plurality of end nodes via the upstream and downstream channels, wherein the plurality of fiber nodes includes at least one RF fiber node and at least one packet fiber node, the at least one packet fiber node including a distributed cable modem termination system (DCMTS), and wherein at least a portion of the end nodes and fiber nodes each include local timestamp circuitry for generating local timestamp information, the computer program product comprising:

a computer usable medium having computer readable code embodied therein, the computer readable code comprising:

computer code for receiving timestamp synchronization information at a first packet fiber node; and

computer code for generating, using the timestamp synchronization information, local timestamp information at the first packet fiber node which is synchronized with the timestamp synchronization information.

71. The computer program product of claim 70 further comprising computer code for providing the timestamp synchronization information to a first DTMTS residing at the first packet fiber node.

72. The computer program product of claim 70 further comprising computer code for providing the local timestamp information to a first DTMTS residing at the first packet fiber node.

73. The computer program product of claim 70 further comprising computer code for providing the local timestamp information to selected cable modems to thereby cause timestamps generated at each of the selected cable modems to be synchronized with the local timestamp information generated at the first packet fiber node.

74. The computer program product of claim 70 wherein the system is further configured or designed to receive the timestamp synchronization information as a modulated carrier signal having the timestamp synchronization information embedded therein.

75. A system for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein the plurality of fiber nodes includes at least one RF fiber node and at least one packet fiber node, the at least one packet fiber node including a distributed cable modem termination system (DCMTS), and wherein at least a portion of the end nodes and fiber nodes each include local clock circuitry for generating local clock signals, the system comprising:

means for receiving a common clock reference signal at a first packet fiber node;

means for generating, using the common clock reference signal, a local clock signal at the first packet fiber node which is synchronized with the common clock reference signal;

means for providing the local clock signal to components at the first packet fiber node, including the DCMTS.

76. The system of claim 75 wherein the system is further configured or designed to receive the common clock reference signal via a first downstream channel.

77. The system of claim 75 wherein the access network is configured to operate at a root clock frequency of m MHz, and wherein a frequency of the common clock reference signal n is an integer multiple of m.

78. The system of claim 75 wherein the common clock reference signal corresponds to a modulated carrier signal having master timestamp information embedded therein.

79. A system for synchronizing devices in an access network, the access network including a head end complex and a plurality of end nodes which utilize at

least one upstream channel and at least one downstream channel for communicating with the head end complex, the access network further including a plurality of fiber nodes interposed between the head end complex and the plurality of end nodes, each fiber node being configured to communicate with the head end complex and the plurality of end nodes via the upstream and downstream channels, wherein the plurality of fiber nodes includes at least one RF fiber node and at least one packet fiber node, the at least one packet fiber node including a distributed cable modem termination system (DCMTS), and wherein at least a portion of the end nodes and fiber nodes each include local timestamp circuitry for generating local timestamp information, the system comprising:

means for receiving timestamp synchronization information at a first packet fiber node; and

means for generating, using the timestamp synchronization information, local timestamp information at the first packet fiber node which is synchronized with the timestamp synchronization information.

80. The system of claim 79 further comprising means for providing the timestamp synchronization information to a first DTMTS residing at the first packet fiber node.

81. The system of claim 79 further comprising means for providing the local timestamp information to a first DTMTS residing at the first packet fiber node.

82. The system of claim 79 further comprising means for providing the local timestamp information to selected cable modems to thereby cause timestamps generated at each of the selected cable modems to be synchronized with the local timestamp information generated at the first packet fiber node.

83. The system of claim 79 wherein the system is further configured or designed to receive the timestamp synchronization information as a modulated carrier signal having the timestamp synchronization information embedded therein.